

Colorado State University

HIGH PLAINS INTERMOUNTAIN CENTER
FOR AGRICULTURAL HEALTH & SAFETY



2013 Annual Report

(September 15, 2012 – September 14, 2013)

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HICAHS Vision:

“A Healthy and Safe Workforce for U.S. Agriculture, Forestry, and Fishing.”

The High Plains Intermountain Center for Agricultural Health and Safety (HICAHS) was established by the National Institute for Occupational Safety and Health (NIOSH) in 1991 to primarily serve the states of

Colorado, Montana, North Dakota, South Dakota, Wyoming, and Utah. We work closely with NIOSH, other NIOSH-sponsored Agricultural Centers, and agricultural

organizations to learn more about the root causes of injury and illness in the agriculture industry. The Bureau of Labor Statistics says that ~500 people die working in agriculture, forestry, fishing, or hunting every year, accounting for 11% of the nation's on-the-job fatalities.¹

The health of agricultural workers is also a top concern. Three-quarters of dairy parlor workers have reported to us that they had body aches, pain, or discomfort in the past 12 months.² Respiratory health

is also a concern due to the high numbers of respiratory illnesses such as bronchitis and asthma.³

Since the creation of the *International Dairy Research Consortium* several years

ago, we have had the opportunity to compare and discuss our findings with dairy worker health and safety researchers around the world. Our special issue in the *Journal of Agromedicine* (see page 7) highlights the global need for health and safety interventions.

The primary focus for HICAHS projects in 2011-2016 is to learn more about the relationship between organic dust aerosols on farms and respiratory disease, improve the musculoskeletal health of

farm workers through better equipment design, develop and improve safety training, and engineer tractor rollover protective structures (ROPS). The year 2013 marks the mid-way point for the 5-year duration of these projects and we are beginning to see the results of our research. Our hope is that within a few years the results of our research will positively affect the health and safety of farmworkers in our region, our nation, and even internationally.

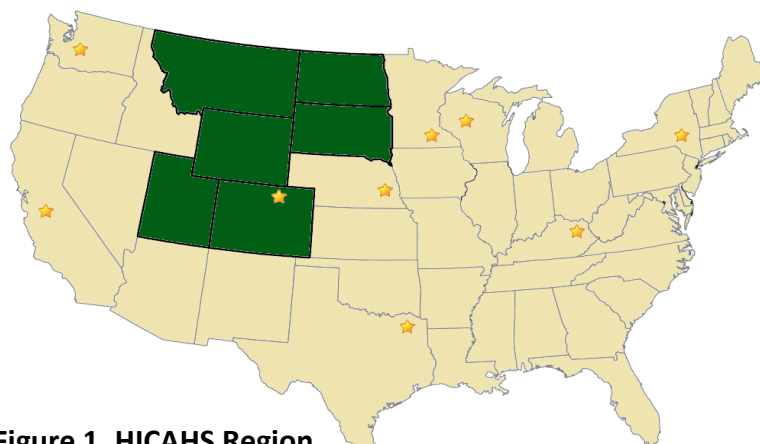


Figure 1. HICAHS Region



NIOSH-Sponsored Ag Health and Safety Center



HICAHS Region (Public Health Service Region 8)

Quick Stats on the HICAHS Region

Did you know that the USDA conducts a census of agricultural operations every 5 years? According to the 2012 Census within the HICAHS Region there are:

- **156,901 farms and ranches** employing over **144,000 workers**.
- 215 million acres of farmland, with the average agricultural operation having 1,472 acres. **This is 23% of the nation's farmland!**
- Over **350,000 dairy cows** producing nearly 5% of the nation's milk supply. If you include cows in NM and TX, this number jumps to 1.1 million cows.⁴

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Health and Safety Outreach: Reaching farmers and ranchers online

HICAHS is committed to increasing communication and adoption of evidence-based health and safety programs through improved methods of communication. The six-state HICAHS region includes over 156,000 farms with a lower population density than the U.S. as a whole; these population densities have important implications for effective communication. In order to address the difficulties we have adopted a number of online methods to reach people. In January, we began a monthly column in the trade publication *Progressive Dairyman*, which has received 2,346 website clicks in 2013. We have also begun working as part of the Leadership Team for the

Farm and Ranch eXtension in Safety and Health (FReSH) Community of Practice (www.extension.org/farm_safety_and_health). By providing article reviews and supporting the development of “Ask an Expert” and article writing, we participated in developing an interactive website that has more than 18,000 visits in a year.

Computer-based ROPS design program

Tractor overturns are the leading cause of occupational fatalities on farms in the US. Roll-over protective structures (ROPS) have been proven effective to reduce fatalities during tractor overturn. ROPS are designed to absorb energy resulting from the impact of the tractor with the ground surface during a tractor overturn, protecting the operator zone from intrusion of outside objects and exposure to the ground plane.

Current ROPS installation rates on agricultural tractors are near 51%, but ROPS are still not available for many common tractor brands such as Allis Chalmers, Farmall, Oliver, White, Minneapolis Moline, and many John Deere models.

A large number of tractors do not have current ROPS designs, and thus have no

PROGRESSIVE DAIRYMAN

January: Dairy worker safety and health: A new column from David Douphrate

February: OSHA inspections, citations and penalties

March: Injury and illness recordkeeping

April: Chemical hazard communication

May: Tractor safety on dairy farms

June: Manure pit safety

July: Respiratory protections

August: Heat stress: Bad for dairy cows and the people who care for them

September: ATV safety

More articles from the dairy worker safety and health series can be found at www.progressivedairy.com

ROPS availability. Costs of low production number ROPS are expensive as the design costs are not spread out over a large number of units sold. In a relatively small four county ROPS retrofitting program conducted by the New York Center for Agricultural Medicine and Health, 76 tractor models and 99 ROPS requests could not be accommodated due to lack

of ROPS availability. These tractors included both pre-ROPS (tractors manufactured prior to ROPS) and post-ROPS tractors (tractors manufactured to fit a ROPS).

The major specific aim of this project is to develop and evaluate a computer-based ROPS design program that will assist in quickly developing ROPS designs based on tractor weights and dimensions. The final product from the model will be ROPS design drawings with specifications that can be used to construct the ROPS. Of the over 2 million agricultural tractors without ROPS, an estimated 10% (from the NY ROPS Retrofit program) do not have a ROPS design.

Potentially this program could be used to fit ROPS to over 200,000 ROPS. By providing a \$500 ROPS solution, instead of a tractor replacement cost (\$10,000), this project could contribute to a potential positive impact of \$1.9 billion.



All tractors produced in the United States since 1986 come with ROPS as standard equipment. Paul Ayers' computer design program will allow retrofitting of older tractors and foreign-made tractors with ROPS.
Photo: CDC/NIOSH

HICAHS Focus on the Dairy Industry

The U.S. Dairy industry has moved to a large-herd, mass production model with a goal of increased milk production at lower cost. Expanding production capacity has required a larger workforce, primarily comprised of non-English speaking Latino workers (> 90%), many with minimal experience in agriculture. Dairy farming is among the most dangerous occupations and accounts for a disproportionately large percentage of all injuries in livestock-related agriculture. Dairy workers also experience relatively high rates of respiratory disease associated with inhalation of dusts during milking, feeding, and other tasks.

We have embarked on several projects to understand and improve health and safety outcomes of dairy workers. In addition, HICAHS has developed several advisory boards to assist with the direction and development of its dairy projects. The *HICAHS Dairy Network, Dairy Advisory Board, and International Dairy Research Consortium* provide avenues for partnership among researchers and stakeholders within the dairy industry. HICAHS also continues collaborative relationships with its general Advisory Board members. In summer 2013 the *International Dairy Research Consortium (IDRC)* met jointly with the HICAHS Dairy Board at Colorado State University; the group had just published a special issue in the *Journal of Agromedicine* describing the state of the dairy industry worldwide. The *IDRC* will be meeting again in October 2014 during the 7th International Symposium: Safety and Health in Agricultural & Rural Populations: Global Perspectives Conference.

At the core of all of our projects and interventions has been a focus on stakeholder engagement and partnership building. The HICAHS approach to address health and safety is to LISTEN to dairy stakeholders, and

RESPOND to expressed needs and concerns with *sound and relevant* research and outreach efforts. Our dairy projects are developed in response to the needs of dairy industry stakeholders.

HICAHS developing an occupational health and safety management system

High employee turnover and lost work time are significant concerns for dairy owners and managers. A new challenge to dairy producers, who are seeking to ensure

programs while not having formal training in employee management or occupational health and safety. Complying with a large number of health and safety regulatory standards while simultaneously training a predominantly non-English speaking workforce is a daunting challenge. In a highly competitive global market it is critical that owners and managers have the knowledge, tools, skills and support needed to effectively address these challenges and sustain a

management practices. Initial efforts have included providing training for producers on the Occupational Safety and Health Administration (OSHA) and on management approaches such as Lean Six Sigma. We are currently gathering feedback from workers and managers to better understand their needs to tailor programs that will be most effective for this workforce. OSHA consultation has been working with dairies across the U.S. and we are



The International Dairy Research Consortium met this summer at Colorado State University. Dairy researchers from Australia, New Zealand, Sweden, Denmark, Finland, and Italy attended the meeting along with several dairy producers and representatives from other Ag Centers.

safe working environments and to comply with state or federal occupational safety and health regulations, is the increased employee numbers. Many owners and managers are now responsible for managing human resources and safety

healthy, productive workforce.

HICHAS researchers are partnering with producers and industry service companies to develop tools and strategies to improve human resource

evaluating relevance and efficacy of their evaluation process. Partnering with a technology supplier dedicated to providing turn-key solutions exclusively to the dairy industry, we are developing state of art occupational health and

safety management tools and effective worker training programs.

The human and economic impact of illness, injury, and fatalities on the dairy industry is significant. In an industry with low profit margins and highly volatile global markets, reducing employee turnover and production costs may make the difference in economic survival. HICAHS efforts will help the dairy industry take a systematic approach to risk management needed to sustain a healthy, productive workforce as an integral component of production, food safety, and animal welfare. **This project could help improve the health of the 160,000 workers in U.S. dairies, reducing medical and workers compensation costs, reducing employee turnover, and improving productivity.** Through our *International Dairy Research Consortium* the impact could be much more significant.

Worker Health, Safety and Performance in Milking Parlors

The HICAHS project "Exposure Assessment and Intervention Analysis in Large-Herd Dairy Parlors" is addressing the health and safety of large-herd dairy workers through assessment and comparison of physical workloads (motion, posture,

muscle forces), and their effect on worker performance. In partnership with dairy equipment manufacturers and dairy producers, researchers are evaluating targeted parlor design and milking tools for their effectiveness at reducing physical loads. The results will be used to determine an optimum parlor milking pit height and develop recommendations for dairy producers to address parlor design, milking tools and worker productivity.

This innovative and novel work is the first to quantify and compare full-shift and task-specific physical exposures in large-herd parlors in the United States. This is being accomplished using direct measurement technology and clinically-relevant exposure metrics. This will also be the first study to use motion capture technology in the challenging work environments of milking parlors.

The potential impact of this project is significant due to an industry shift toward mass production dairy

operations which has led to increased risk of work-related musculoskeletal disorders (MSD) among workers. This is a result of task specialization and limited variability, as well as increased work demands.



With the goal of increased milk production at lower cost, dairies will continue to grow in size and capacity. As the trend toward larger herd sizes continues, the need for effective health and safety intervention research in the dairy industry has become even more significant. The project involves the

evaluation of novel, ergonomically designed milking equipment to not only reduce ergonomic exposures related to the development of musculoskeletal disorders, but also improve worker performance, efficiency, and productivity.



Have a question about
agricultural health and safety?
Ask an expert at
[www.extension.org/
farm_safety_and_health](http://www.extension.org/farm_safety_and_health)

Improving our understanding of respiratory disease

Respiratory diseases including chronic bronchitis and occupational asthma are a significant problem among dairy workers, contributing to high employee turnover, decreased productivity, and higher worker compensation costs. While it is clear that exposure to dusts containing endotoxins from the cell walls of gram-negative bacteria play an important role, we have demonstrated that agricultural dusts containing gram-positive

bacteria also contribute to inflammation of human lung cells. These studies have traditionally used settled dusts and dust extracts, not aerosolized dust is more relevant for how dust affects human respiratory health.

Improved characterization of agricultural aerosols is needed to explain the causes of respiratory diseases and to develop interventions that effectively reduce exposures. The objectives of the project, "Bioaerosol Exposures and Models of Human Response in Dairies" are to apply powerful new tools to better understand bioaerosols in dairies and to compare three different approaches for measuring the effects of bioaerosols in the human lung: a traditional model using submerged lung cells; a novel model using an aerosol sampler which includes



Journal of Agromedicine

Volume 18, Issue 3,
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Special Issue: A Global Perspective on
Modern Dairy: Occupational Health and
Safety Challenges and Opportunities

1. [International Dairy Health and Safety](#)
2. [Occupational Health in the Dairy Industry Needs to Focus on Immigrant Workers, the New Normal](#)
3. [The Dairy Industry: A Brief Description of Production Practices, Trends, and Farm Characteristics Around the World](#)
4. [Ergonomics in Modern Dairy Practice: A Review of Current Issues and Research Needs](#)
5. [Occupational Health and Safety Regulations in the Dairy Industry](#)
6. [Systematic Review of Respiratory Health Among Dairy Workers](#)
7. [International Perspectives on Psychosocial Working Conditions, Mental Health, and Stress of Dairy Farm Operators](#)
8. [Work-Related Injuries and Fatalities on Dairy Farm Operations—A Global Perspective](#)
9. [A Review of Health and Safety Leadership and Managerial Practices on Modern Dairy Farms](#)
10. [Occupational Health and Safety Aspects of Animal Handling in Dairy Production](#)

Download the entire issue at
<http://www.tandfonline.com/toc/wagr20/18/3>

human lung cells; and nasal samples taken from workers in these environments.

This project will develop better tools for understanding agricultural lung disease, and will provide data to help develop and evaluate effective interventions. This study will also provide a first step in understanding upper respiratory injury from exposure to larger particles in the agricultural workplace. Potentially this project could help improve the respiratory health of the more than 160,000 workers in U.S. dairies, reducing medical and workers compensation costs, reducing employee turnover, and improving productivity.



Teresa Tellechea tests out a cow back scratcher at a Colorado dairy farm. This photo is part of a collection of Teresa's visits to dairy farms.

The project has broad implications for reducing exposures to inflammatory aerosols in a wide range of agricultural and other industries.

Enhancing safety training on dairies

A combination of organizational, management and worker characteristics play a critical role in an effective safety training program. HICAHS has embarked on a project to understand the barriers and facilitators that influence safety behaviors and

accidents, with the end goal of developing a safety training program specifically for dairies. Dr. Teresa Tellechea, a cultural anthropologist, interviewed workers in Spanish in Texas, New Mexico, and Colorado and also created a photo essay to visually document the work life of dairy workers and managers. Teresa resigned

from the project in January to join her husband overseas as he prepares for a U.S. diplomatic appointment. HICAHS was pleased when Dr. Noa Roman-Muniz agreed to lead the project and assume the responsibilities of the project investigator in August 2013. Noa is a native Spanish-speaker, a veterinarian, and the Colorado Dairy Extension Specialist. She is working with Dr. John Rosecrance on all aspects of the daily conduct of the study, including recruitment of partners, data collection, writing reports, publications, conducting training, leading interviews, and providing specialized assistance in the area of cultural appropriateness, qualitative measures, translation of materials, culturally targeted dissemination.

Following participant observation and direct observation of workers in 9 dairies by former Project Investigator Teresa Tellechea, Dr. Noa Roman-Muniz is beginning to conduct interviews to identify barriers to health and safety identified by focus groups and to obtain content for the training. The training materials will be targeted towards the more than 6,000 hired dairy farm laborers in the HICAHS region.



Extension Agents receive ATV training at a HICAHS-sponsored event in Montana.

Pilot Program

During the 2013 fiscal year, the HICAHS Pilot Program funded two related projects to Thia Walker and Delphine Farmer at Colorado State University. The goal of the projects is to improve cleaning procedures for pesticide equipment. Studies suggest that cleaning practices for spray tanks are inconsistent, potentially leading to pesticide residues in tanks. Pesticide residues in spray tanks can lead to unintentional worker exposures and to unintended application of pesticides to agricultural areas. The first project titled "Survey & Effectiveness of Pesticide Application Equipment Cleanout Methods" by Thia Walker assessed the barriers

to cleaning out pesticide spraying equipment and the methods used to clean equipment. The second project titled, "Improving pesticide tank clean-out: Analytical techniques and sample measurement" by Delphine Farmer analyzed the rinse from pesticide application equipment in order to assess the effectiveness of various cleaning procedures. The project resulted in a new chemistry technique for determining pesticide residues. Results showed that the industry standard of three repeated rinses removes the majority (typically >98%) of pesticide.

Community-Initiated Small Grants Program

Through community-initiated small grants, community organizations and HICAHS researchers are engaged together in agricultural health and safety education and training programs. A great emphasis of the Community-Initiated Grants Program is to improve all-terrain vehicle (ATV) safety within the agricultural community. ATVs are lightweight, easily maneuverable, and fast, making them attractive to use on farms and ranches for tasks that had been accomplished with the help of horses, farm dogs, and trucks or pick-ups. Unfortunately, ATVs are inherently unstable, leading to crashes. Only 20 percent of ATVs at work are used in agriculture, but a staggering 60 percent of all occupational ATV-related deaths between 1992 and 2007 in the United States occurred on agricultural operations!

Through a partnership with Montana State University Extension, ranchers, and HICAHS, we have created educational flyers and posters on the four primary ranching tasks that involve intensive ATV use: (1) animal handling, (2) fence building and mending, (3) weed control/spraying, and (4)

general transportation. These items can be found on the website created for this project:

<http://www.safeatv.org/>.

HICAHS expanded the ATV safety program to include hands-on training for ranchers in Montana. A major barrier for ranchers to obtain the current ATV Safety Institute (ASI) training was the lack of qualified trainers within the region. In response to this need HICAHS has supported ASI Certification for four Montana State University Extension Agents. These Extension Agents have, in turn, trained 8 agricultural producers and more trainings are planned.

For 2013, HICAHS sponsored the development of an “ATV Safety Training Kit” for Ag Extension Agents. The kit includes poster placards, a PowerPoint presentation, an educational script and evaluation materials.

The momentum continues to grow in Montana for increased awareness of ATV safety through partnerships. Montana Extension Agents secured ATV safety training approval for pesticide licensing points because ATVs are used for pesticide application. In addition, the Extension Agents are developing a 90-minute ATV

safety training for an annual Montana Farm Bureau event.

Evaluation Program

The HICAHS Evaluation Program continually evaluates progress on HICAHS objectives and receives feedback from agricultural stakeholders on HICAHS research and products. In 2013, the Evaluation Team began developing a needs assessment survey to identify emerging trends in agriculture and unmet agricultural health and safety needs. The survey was piloted among HICAHS Advisory Board members in February 2014 and is currently being given to agriculture, forestry, and fishing stakeholders such as 4-H, commodity groups, Agricultural Commissioners, and producer groups. Data collected from the needs assessment will be used to guide future HICAHS projects.

Since the Center’s inception in 1991 HICAHS has shared resources and ideas on evaluation with the other NIOSH-sponsored Ag Centers. In April 2013, personnel from all 10 Ag Centers came to Fort Collins for a HICAHS-sponsored Evaluation Conference. Director John Howard provided a history of evaluation in his keynote address. Other keynote speakers included Captain Brad Husberg, Director of the NIOSH Office of Agriculture Safety and Health, Dr. Steve Dearwent in the NIOSH Office of Extramural Programs and Dr. Paul Gunderson, chair of both reviews of the NIOSH Agriculture, Forestry, and Fishing programs.

As a result of this conference HICAHS Evaluation Director Vicky Buchan, Co-Director Louise Quijano, and other agricultural center evaluators plan to work with NIOSH on improving the reporting



Keynote speakers at the 2013 Spring Evaluation Workshop held in Fort Collins, CO. From left to right: Dr. John Howard, Dr. Paul Gunderson, and CAPT Brad Husberg. Keynote speaker Dr. Steve Dearwent presented via teleconference.

database that is used to communicate Center achievements to members of Congress and interest groups. The evaluators, coordinators, and outreach personnel from all the Ag Centers continue to meet monthly and have established creative ways to collaborate together.

Assisting Communities to Prepare for Disasters

Drs. Vicky Buchan and Louise Quijano are Co-Principal Investigators on a 2-year community disaster planning project with Drs. Ragan Adams (Co-Principal Investigator) and Frank Garry (Principal Investigator), veterinarians from the

Colorado State University Department of Clinical Sciences. The grant “Community Capacity Building for Disaster Planning for Pets and Service Animals” is funded by the United States Department of Agriculture and will assist 11 communities in Colorado on expanding their emergency response plans. The revised plans will include an annex on animal evacuation, as required by the Federal Emergency Management Agency. A tool kit and manual are being evaluated and revised and will be made available nationwide through the Extension Disaster Education Network (EDEN, eden.lsu.edu).

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The reports contents are solely the responsible of the High Plains Intermountain Center for Agricultural Health and Safety and do not necessarily represent the views of the National Institute for Occupational Safety and Health.

The contents of this report were written by HICAHS staff and edited and prepared by Allison DeVries Cassidy. Report date: June 10, 2014.



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